

Diabetes

Definition: A chronic condition characterized by an inability to produce and/or properly utilize the hormone insulin, which plays a central role in the metabolism of sugar (glucose) in the blood stream. Ten percent of people with diabetes have insulin dependent diabetes mellitus (IDDM), characterized by lack of insulin production. Ninety percent of people with diabetes have non-insulin dependent diabetes mellitus (NIDDM), characterized by ineffective utilization of insulin. ICD-9 code: 250

Summary

About 160,000 people in Washington are known to have diabetes, and an equal number probably have the disease but do not know it. The estimated prevalence is about 6 percent of the general population.

Diabetes was associated with 38,909 hospitalizations in Washington in 1994 (rate: 243/1,000 people with diabetes). Most of these admissions are a result of diabetes complications, including coronary heart disease, stroke, diabetic ketoacidosis, and lower extremity amputations. Many of these hospitalizations could be prevented through early detection and appropriate management of diabetes and its complications. Effective interventions include diabetes self-management education and development of systems to coordinate and assure medical management in accordance with current practice guidelines.

Time Trends

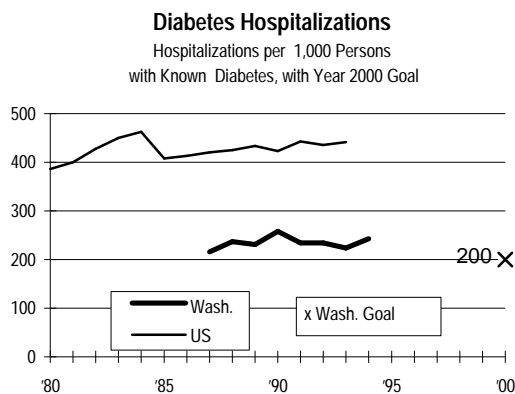
Rates of diabetes-related hospitalizations among persons with known diabetes have increased slightly in Washington and nationally since 1987. (See Technical Note.) Although Washington's rates are consistently lower than the US, they are consistent with the rates of other western states. A potential reason for these lower

rates is that African Americans are a small percent of the state population. African Americans with diabetes are at increased risk for hospitalizations. Other explanations that need further investigation include differences in hospitalization practices between the eastern and western US and the increased penetration of managed care which has demonstrated lower rates of hospitalization.

The rise in hospital discharges for people with diabetes is due in part to the increasing numbers of older adults in the population and the growing number of people with diagnosed diabetes. Increased awareness of diabetes resulting in more complete coding on the hospital discharge summary may also explain part of the observed change.

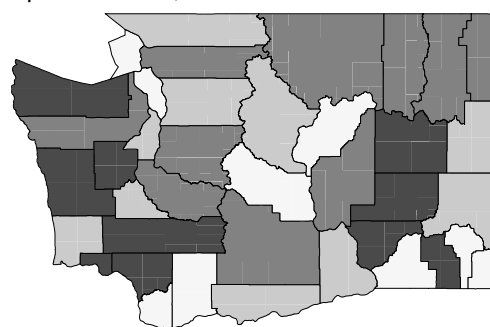
Year 2000 Goal

Washington's goal for the year 2000 is a reduction in the diabetes-related hospitalization rate to no more than 200 per 1,000 people with known diabetes. In light of the current trend, reaching this goal would probably require increased attention to effective strategies for prevention of diabetes complications.



Diabetes Hospitalizations, 1992-1994

Hospitalizations Per 100,000 Persons With Known Diabetes



Hospitalization Rates

93.1 to 184.9
185.0 to 233.6
233.7 to 284.9
285.0 to 395.1

State Average: 233.7
National Rate: 441 (1992)

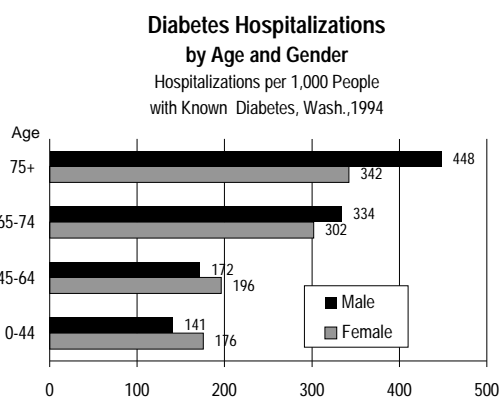
Geographic Variation

The counties with the highest diabetes hospitalization rates for 1992-1994 were Adams, Grays Harbor, Lewis, Mason, Columbia, Franklin, Cowlitz, Wahkiakum, Lincoln, and Clallam. Many of these counties are clustered in southwest Washington and the Olympic peninsula.

The counties with the lowest rates were San Juan, Skamania, Garfield, Island, Clark, Walla Walla, Asotin, Douglas, and Kittitas.

Age and Gender

Most diabetes-related hospitalizations occur in older adults; 56% of all admissions are among people aged 65 and older. Hospitalization rates increased with age. In the younger age groups females are hospitalized at a greater rate than males. In the older age groups, men are hospitalized more often.



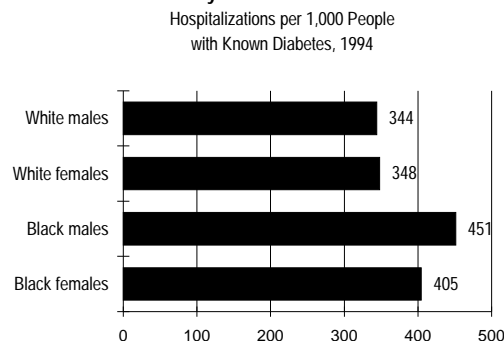
Race and Ethnicity

Washington's hospital discharge summary data do not include race and ethnicity. At the national level, however, diabetes-related hospital discharge rates vary by race and gender. African American males show the highest rates, and African Americans rates overall are higher than those for Caucasians. Since 1990, hospitalization rates for African Americans with diabetes have risen steeply. Caucasian females are the only group to show decreases in recent years.

Other Measures of Impact and Burden

Prevalence. While 160,000 people in the state of Washington (about 3% of the general population) are known to have diabetes, an equal number are estimated to have undiagnosed

US Diabetes Hospitalizations by Race and Gender



diabetes. In people with non-insulin dependent diabetes, the disease has, on average, progressed for 7 years prior to diagnosis, based on the progression of diabetes complications found at diagnosis.¹

Complications. Six major complications result from the progression of diabetes. Damage to large blood vessels leads to 3 to 4 times the rate of **coronary heart disease** and **stroke** in people with diabetes. Diabetic eye disease is the major cause of adult **blindness**. Nerve and circulatory damage makes diabetes the leading cause of non-traumatic **amputation**. Diabetic **kidney disease** is the leading cause of new dialysis cases. Infants born to women with IDDM have a three fold increase of **birth defects**. Medical treatment of these complications causes the high hospitalization rates among people with diabetes.

Length of stay/multiple admissions. The average length of stay for admissions complicated by diabetes has dropped from 6.4 days in 1987 to 5.1 in 1994. This is in contrast to 4.1 days for people without diabetes in 1994. Of the diabetes-related admissions in that year, 34% were re-hospitalized within the same year.

Costs. Nationally, hospitalizations account for 40% of all medical expenditures for diabetes.² In Washington, the total hospital charges for diabetes-related admissions increased 270% from \$131 million in 1987, to \$353 million in 1994. (See Technical Notes on method of calculating these charges.) Medicare sustained the most charges for all age categories of diabetes admissions, accounting for \$212 million in 1994. Per hospital stay, charges for diabetes-related hospitalizations averaged \$9,074, while for people without diabetes the average charges were \$6,890.

Risk and Protective Factors

In 1994, 62% of all diabetes-related hospital admissions were potentially preventable through reductions in modifiable risk factors. Reducing risk factors for complications among people with diabetes can help prevent those complications and their associated admissions.

Coronary heart disease, cerebrovascular disease, and hypertension. Diabetes, along with age, sex, and heredity, is a non-modifiable risk factor for the development of coronary heart disease and stroke. The table below shows modifiable risk factors for cardiovascular disease and the prevalence of these risk factors among people with and without diabetes.

Risk factor	People with diabetes	People without diabetes
Smoking*	22%	22%
Physical inactivity**	56%	49%
Obesity*	49%	23%
High cholesterol ³	36% ***	24%
Hypertension ³	61% ***	14%

* 1992-94 WA BRFSS ** 1991-94 WA BRFSS ***NIDDM

Hypertension and/or diseases of the heart or kidneys resulting from hypertension were co-morbid conditions for 25% of all diabetes-related admissions in 1994. National data indicate that 61% of people with NIDDM have high blood pressure, of which two-thirds is uncontrolled.³

Diabetic ketoacidosis (DKA). Diabetic ketoacidosis is a life-threatening but preventable condition of uncontrolled blood sugar. Nationally, people with Medicaid or no health insurance had DKA hospitalization rates 2 to 3 times higher than people with private health insurance. The modifiable risk factors that precipitate DKA admissions include infection, influenza, poor self-care, psychological problems, lack of access to medical care, and health care provider failure to recognize illnesses that precipitate DKA. Up to 50% of the DKA admissions can be avoided by appropriate emergency medical treatment and timely access to the health care system.³

Lower extremity amputation. People with diabetes are more than 40 times more likely to require surgical removal of part of a foot or leg due to infection or vascular disease than those without diabetes. Admissions for lower extremity care are

more expensive than other diabetes-related admissions. They have an average charge of \$11,814 compared to \$8,940 for other diabetes-related hospitalizations. People with diabetes-related lower extremity problems are at an increased risk for hospitalizations because poor circulation and lack of feeling in their feet and legs results in slower healing and greater chances of infection. Patient education and daily foot care have proven effective in reducing amputations by fifty percent.⁴

Protective Factors. Two consistent protective factors apply across all diabetes-related admissions: 1) self-care education of people with diabetes, resulting in positive health behaviors and risk factor reduction; and 2) implementation of current practice guidelines by health care providers. Efforts to enhance these factors form the basis for the interventions discussed below.

High Risk Groups

Approximately 90% of all cases of diabetes in the US are NIDDM. The following factors help to identify groups at higher risk for developing NIDDM:

Age. In most populations, the incidence of NIDDM is low before age 30, increasing rapidly with older age. People genetically predisposed to diabetes develop NIDDM at earlier ages. By age 70, approximately 20% of non-Hispanic whites, 30% of African Americans and 25 % of Hispanics in the US have diagnosed NIDDM.³

Obesity. The presence and duration of obesity are important factors for developing diabetes. In Washington, twice as many people with diabetes are obese as compared to people without diabetes. Physical inactivity and a high calorie, high fat diet contribute both to obesity and to NIDDM.

Family history of diabetes. Presence of NIDDM in a family member is an established risk factor for NIDDM. This family clustering is likely to be the result of both shared genes and shared behavioral and environmental risk factors.

Race/Ethnicity. Some parts of the world have no cases of NIDDM, while among Pima Indians of the southwestern US, nearly half of the adult population is affected. National data indicate that the proportion of adults with diabetes, both diagnosed and undiagnosed, is 9.6% among African Americans and Mexican Americans, 5 to 50% among American Indian groups and 6.2% among Caucasian Americans.⁵ These differences

are, in a large part, due to underlying differences in the prevalence of obesity and other behavioral risk factors.

Intervention Points, Strategies and Effectiveness

Diabetes self-management education and improved organization of health care services for people with diabetes, with an emphasis on population-based management, are the two primary public health approaches most likely to reduce diabetes-related hospitalizations. Recent studies have demonstrated the ability to retard the development of diabetic complications.³ Near normalization of blood glucose, routine monitoring, and early treatment of the initial symptoms of complications will prevent many diabetes-related hospitalizations.

Outpatient diabetes self-management training has been demonstrated to reduce diabetes related hospitalizations by up to 73%.⁶ Inpatient diabetes education delivered by a diabetes care team can reduce length of hospital stay by 56%.⁷ However, only 35% of people with diabetes in the US have taken an educational class or program.³

Most people with diabetes receive information about and treatment for their diabetes from their primary care provider. Family practice or internal medicine physicians treat 95% of diabetes.³ As the scientific literature demonstrating the importance of tight blood sugar control and careful monitoring in diabetes management accumulates, primary care providers remain inconsistent in providing effective diabetes care.⁸ Public health agencies can promote population-based diabetes management, to providers and extended care personnel, in order to guarantee the routine delivery of a minimum set of services, including monitoring and control of blood sugar and blood pressure, cardiovascular risk factor screening, yearly dilated eye exams and kidney evaluations, routine foot exams, and ongoing patient education.⁹

Health care provider behavior is notoriously difficult to change, however. Ongoing changes in the health care delivery system provide an unprecedented opportunity to assure quality diabetes care. Efforts on the part of managed care organizations to standardize medical care are consistent with assuring optimal diabetes management. Unpublished preliminary findings from managed care projects have demonstrated

improved diabetes outcomes and reduced costs. Public health agencies can work directly with managed care organizations to help them identify their population with diabetes, develop systems for population-based management, and monitor system implementation and outcomes.¹⁰

Additional interventions likely to be of value include public education strategies to increase awareness of the seriousness of NIDDM and its risk factors. This approach can help promote early diagnosis. Also, primary prevention of NIDDM is possible through population-based prevention strategies to promote physical activity and reduce the prevalence of obesity.¹¹

Data Sources

State hospital data: Washington Comprehensive Hospital Abstract Reporting System (CHARS)

Diabetes population data: Washington population and National Health Interview Survey (NHIS)

National data: Centers for Disease Control, Division of Diabetes Translation

For More Information

An Assessment of Diabetes in Washington, Washington Department of Health, May, 1995

Washington Department of Health, Diabetes Control Program, (360) 586-6091.

Technical Notes

Denominators for all calculations are based on estimates of the prevalence of diagnosed diabetes in Washington (diabetes population data), about 3% of the population.

Diabetes-related hospitalizations: Any admission where diabetes (ICD-9-CM code 250) was listed as a primary or secondary diagnosis.

Diabetes-related hospitalization charges: Charges from all diabetes-related admissions in CHARS.

County specific diabetes estimates: Age and sex specific prevalence figures from NHIS applied to age and sex specific county populations.

Endnotes:

¹ Diabetes Care, 15:815-19, 1992

² American Diabetes Association Vital Statistics 1996

³ US NIDDK. Diabetes in America. US DHHS, Nov 1995. NIH No. 95-1468

⁴ NEJM 1972, 286:388-91.

⁵ US NIDDK. National Diabetes Fact Sheet. US DHHS, Oct 1995.

⁶ Journal of Insurance Medicine, 18(3):24-30, 1986.

⁷ Am J Med, July 1995, 99:22-25.

⁸ Metabolic Control Matters, May 1994. NIH No. 94-3773

⁹ Diabetes Care, Jan 1995, 18(1):177-126.

¹⁰ Refining Methods for Measuring and Improving Health Care Quality, Washington DOH, Oct 1995.

¹¹ Diabetologia, 1991, 34:89-98.